

**IMPACT OF OIL PRICES ON ALBERTA'S
ECONOMIC GROWTH & LABOUR MARKET
- AN ECONOMETRIC ANALYSIS**

Research Paper No.3

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by
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IMPORTANT NOTE

This Technical Paper has been prepared by the Corporate Forecasting Group, Long Range Planning Branch, Planning and Building Department. The Paper documents research results as part of an ongoing forecasting activity. Neither the methods or results have been endorsed by the City of Edmonton.

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1. INTRODUCTION

The world oil price has been in a state of turbulence and its future prospect is at best uncertain since it declined from \$27.47 US per barrel in early December 1985 to \$12 US per barrel in April 1986 before it rose to around \$15 US per barrel in May 1986. The drop of the oil prices has created cash flow problems and substantially reduced energy investment by the oil and gas industry. This, in turn, brought about a significant impact on the resource-based Alberta economy.

The purpose of this report is to assess the impact of different world oil prices on the Alberta economy in general and on the labour market in particular. These impacts will be measured by utilizing a macro-econometric model of the Alberta economy.

In section 2, a theoretical model is developed for the Alberta's gross domestic product and for Alberta's labour market. The model consists of 5 structural equations describing the functional causal relationship among various variables and 4 definitional equations. The structural equations are tested and estimated in section 3, using the ordinary least squares technique and data for the period 1971 to 1985. The model equations are solved simultaneously for endogenous variables and their sensitivity to the oil price changes is analyzed in this section. In section 4, the model is simulated to generate values for all endogenous variables based on the two different oil price scenarios and a comparison is made between the two sets of results.

2. THE THEORETICAL MODEL

2.1. Gross Domestic Product (GDP)

The total output in the economy, based on the production theory, is determined by the levels of production factors which include labor and capital stock. The higher are the production factors, the more is the output, assuming the level of productivity remains constant. One other factor which has contributed significantly to the total output in the industrialized countries, especially since the industrial revolution, is technological change. Technical progress in production has helped improve productivity of labor and capital, thus increasing total output even without increasing other production factors. Therefore, the production function can be expressed as follows:

$$(1) \text{ GDP} = G(\text{EMP}, K, T); \text{ with } G'_{\text{EMP}} > 0, G'_K > 0, G'_T > 0.$$

Where GDP stands for gross domestic products, EMP for total employment, K for capital stock and T for technology. Each of the production factors is expected to have a positive relation with the total output.

Capital stock is an accumulation of past net investment which is affected by interest rates. In Alberta, the world oil prices, the National Energy Program and other government policies on energy royalties and taxes have also had an important impact on the level of investment, especially in the energy industry. The capital stock (or investment) function for Alberta can therefore be expressed as follows:

$$(2) K = K(\text{IR}, \text{WOP}, \text{NEP}); \text{ with } K'_{\text{IR}} < 0, K'_{\text{WOP}} > 0, K'_{\text{NEP}} < 0.$$

Where IR stands for interest rates, WOP for world oil prices and NEP for the National Energy Program. The world oil price is expected to have a positive relation, while the interest rates and the National Energy

Program have a negative relation with the capital stock.

By substituting the capital stock equation (2) into equation (1), the production function becomes the following:

$$(3) \text{ GDP} = G(\text{EMP}, \text{IR}, \text{WOP}, \text{NEP}, \text{T});$$

with $G'_{\text{EMP}} > 0$, $G'_{\text{IR}} < 0$, $G'_{\text{WOP}} > 0$, $G'_{\text{NEP}} < 0$, $G'_T > 0$

Equation (3) indicates that total output in Alberta is determined by labour, interest rates, world oil prices, the National Energy program and technology.

If the relationship between the output and its determinants is linear, equation (3) becomes:

$$(4) \text{ GDP} = a_0 + a_1 \text{EMP} + a_2 \text{IR} + a_3 \text{WOP} + a_4 \text{NEP} + a_5 \text{T}$$

Where a_i is the coefficient associated with the i^{th} determinant; it measures the direction and the degree to which the total output responds to a per unit change in the affecting factor.

2.2 The Labour Market

The factors which affect the labour market in Alberta are investigated in this section. The economic structure may change over time, but its change takes place only gradually. Moreover, some of the basic structure of the economic system remains unchanged over time, especially the institutional components. Therefore, most of people employed this year are expected to remain employed next year. This implies that the level of employment this year in an economy will influence the level of employment next year. In addition, the level of economic activity will influence the level of employment. This reflects the demand side of the labour market. When the level of general economic activity is high, demand for labour will be high; and vice versa. Therefore, the employment function can be expressed as follows:

$$(5) \text{ EMP} = L(\text{EMPL1}, \text{GDP}); \text{ with } L'_{\text{EMPL1}} > 0, L'_{\text{GDP}} > 0$$

Where EMPL1 stands for the level of employment in the previous year. Both factors are expected to have a positive relation with the level of employment.

Expressed in a linear form, equation (5) becomes:

$$(6) \text{ EMP} = b_0 + b_1 \text{ EMPL1} + b_2 \text{ GDP}$$

Where b_1 is the coefficient associated with the 1th determinant; it measures the direction and the degree to which the total employment responds to a per unit change in the determinant.

Labour force participation rate is determined by the socio-economic factors which influence the supply side of the labour market. Employment opportunity is an important factor influencing decisions to enter the labour market. When the employment opportunities are abundant and it is easy to find a job, people are encouraged to enter the labour force. The employment opportunity is reflected in the level of general economic activity which is measured by the gross domestic product (GDP). Therefore, the labour force participation rate is expected to be positively related to the level of real GDP.

Similarly, the unemployment rate is expected to affect the labour force participation rate. However, there are two opposite forces affecting how the unemployment rate may influence the participation rate. When the economy is in recession and the unemployment rate is high, additional workers may have to enter the labour market to bolster declining family income. On the other hand, some unemployed workers may give up the apparently hopeless job search and withdraw from the labour market. Therefore, the relationship of the unemployment rate with the participation rate depends on which force is stronger than the other (See Jacob Mincer, 1971; W.G. Bowen et. al., 1969). However, financial considerations

are expected to override the frustration of job-seeking, because unemployment insurance payments last for a limited duration only. With the number of additional workers expected to exceed the number of discouraged workers during a recession, the participation rate is expected to relate positively to the unemployment rate in the previous year.

It is a general belief that people always strive to maintain or improve their living standards during their lifetime which can be measured by the real personal income per capita. One way to increase their income is for themselves or their spouses to enter the labour market if they are currently out of the market. A higher personal income per capita in the previous year, therefore, tends to raise the labour force participation rate in the current year. (See Robert Mansell, et. al., 1981).

The sex composition of the working age population (age 15 and above) has also some bearing on the overall participation rate. Historically, the female participation rate was lower than the male participation rate. Although the difference between the two rates has been narrowing over time, it is a slow process and the gap is not expected to completely close in the foreseeable future. Therefore, the higher the percentage of the total working age population accounted for by the female working age population, the lower the overall participation rate.

Mathematically, the functional relationship of the above factors with the labour force participation rate can be expressed as follows:

$$(7) \text{ PR} = \text{F}(\text{GDP}, \text{URL1}, \text{RPIL1}, \text{FWAP});$$
$$\text{with } \text{F}'_{\text{GDP}} > 0, \text{F}'_{\text{URL1}} > 0, \text{F}'_{\text{RPIL1}} > 0, \text{F}'_{\text{FWAP}} < 0$$

Where PR stands for the labour force participation rate, GDP for the real gross domestic product, URL1 for the unemployment rate in the previous year, RPIL1 for the real personal income per capita in the previous year, and FWAP for the percentage of the total working age population accounted for by the female working age population.

Expressed in a linear form, equation (7) becomes:

$$(8) \text{ PR} = c_0 + c_1 \text{ GDP} + c_2 \text{ URL1} + c_3 \text{ RPIL1} + c_4 \text{ FWAP}$$

Where c_1 is the coefficient associated with the i^{th} determinant; it measures the direction and the degree to which the labour force participation rate responds to a per unit change in the influencing factor.

Because the real personal income per capita appears in the right hand side as an influencing variable in equation (8), there is a need to identify the factors which determine this variable. The real personal income per capita in the current year (RPI) is expected to be positively related to the real personal income per capita in the previous year (RPIL1), reflecting the intention of most people to maintain their living standards. At the same time, the real personal income is also expected to be positively affected by the economic growth rate (RGDP) for the same year. The functional form is as follows:

$$(9) \text{ RPI} = Q(\text{RPIL1}, \text{RGDP}); \text{ with } Q'_{\text{RPIL1}} > 0, Q'_{\text{RGDP}} > 0$$

In a linear form, equation (9) becomes:

$$(10) \text{ RPI} = d_0 + d_1 \text{ RPIL1} + d_2 \text{ RGDP}$$

Once the labour force participation rate is determined, total labour force (LF) can be obtained by multiplying total working age population (WAP) by the labour force participation rate, that is,

$$(11) \text{ LF} = \text{PR} \times \text{WAP}$$

The unemployed labour force (UNEMP) is the difference between total labour force and total employment, that is,

$$(12) \text{ UNEMP} = \text{LF} - \text{EMP}$$

The unemployment rate (UR) is obtained by dividing the unemployed labour force by total labour force and multiplying the ratio by 100, that is,

$$(13) \text{ UR} = 100 \times \text{UNEMP/LF}$$

The total working age population is expected to be positively related to the size of population (POP) but negatively related to the unemployment rate in the previous year (URL1) which is expected to affect the size of net migration to Alberta for the current year. These relationships can be mathematically expressed as below:

$$(14) \text{ WAP} = W(\text{POP}, \text{URL1}); \text{ with } W'_{\text{POP}} > 0, W'_{\text{URL1}} < 0.$$

In linear form, this equation becomes:

$$(15) \text{ WAP} = e_0 + e_1 \text{ POP} + e_2 \text{ URL1}.$$

Where e_1 is the coefficient associated with the i^{th} explanatory factor.

Population (POP) for the current year is equal to population for the previous year (POPL1) plus natural increase and net migration (MIGN). The natural increase is equal to the population in the previous year multiplied by the rate of natural increase (RNI). Therefore the population equation can be defined as follows:

$$(16) \text{ POP} = (1 + \text{RNI}/100) \text{ POPL1} + \text{MIGN}$$

3. ESTIMATION OF THE MODEL

The theoretical linear relationships as expressed in equations (4), (6), (8), (10) and (15), were tested and estimated for the period 1971-1985 in Alberta, using the ordinary least squares technique. The estimated equations are shown below:

$$\begin{aligned}
 (17) \text{ GDP} &= -149.822 + 0.07647 \text{ T} - 0.60264 \text{ NEP} \\
 &\quad (1.67) \quad (1.66) \quad (4.93) \\
 &+ 0.07165 \text{ RWOP} - 0.04791 \text{ RIR} + 0.01092 \text{ EMP} \\
 &\quad (2.17) \quad (1.85) \quad (7.02)
 \end{aligned}$$

$$R^2 = 0.9975, R^{-2} = 0.9961, \text{ SEE} = 0.142, \text{ DW} = 2.17$$

$$\begin{aligned}
 (18) \text{ EMP} &= -4.19 + 0.4451 \text{ EMPL1} + 44.33 \text{ GDP} \\
 &\quad (0.64) \quad (8.66) \quad (10.28)
 \end{aligned}$$

$$R^2 = 0.9971, R^{-2} = 0.9966, \text{ SEE} = 10.68, \text{ DW} = 2.05$$

$$\begin{aligned}
 (19) \text{ PR} &= 108.96 + 0.9435 \text{ GDP} - 1.1700 \text{ FWAP} + 0.1504 \text{ URL1} + 0.0005 \text{ RPIL1} \\
 &\quad (6.64) \quad (7.72) \quad (3.56) \quad (4.98) \quad (3.33)
 \end{aligned}$$

$$R^2 = 0.9954, R^{-2} = 0.9936, \text{ SEE} = 0.26, \text{ DW} = 2.40$$

$$\begin{aligned}
 (20) \text{ WAP} &= -389.056 + 0.9201 \text{ POP} - 2.8969 \text{ URL1} \\
 &\quad (18.33) \quad (79.66) \quad (2.24)
 \end{aligned}$$

$$R^2 = 0.9984, R^{-2} = 0.9981, \text{ SEE} = 10.709, \text{ DW} = 1.60$$

$$\begin{aligned}
 (21) \text{ RPI} &= 548 + 0.9624 \text{ RPIL1} + 49.7817 \text{ RGDP} \\
 &\quad (1.05) \quad (22.68) \quad (2.70)
 \end{aligned}$$

$$R^2 = 0.9836, R^{-2} = 0.9809, \text{ SEE} = 225, \text{ DW} = 1.31$$

Where:

GDP = Gross domestic product in 1971 billions of dollars.

RGDP = Percentage increase of GDP.

T = The actual year, eg. 1971, 1972 etc., representing technical change.

NEP = 1 for those years when the National Energy Program was in effect, and 0 for other years.

RWOP = World oil prices in 1971 U.S. dollars (discounted by Alberta's GDP deflator).
 RIR = Real prime rates (discounted by Canada's CPI).
 EMP = Total employment in Alberta, in thousands of persons.
 EMPL1 = Total employment in the previous year, in thousands of persons.
 URL1 = Unemployment rate in the previous year.
 RPI = Real personal income per capita in 1981 dollars (discounted by Edmonton's CPI).
 RPIL1 = Real personal income per capita in the previous year.
 WAP = Total working age population (i.e., population aged 15 and above), in thousands of persons.
 FWAP = The percentage of total working age population accounted for by the female working age population.
 POP = Alberta's total population, in thousands of persons.
 R^2 = Coefficient of multiple correlation.
 R^{-2} = Coefficient of multiple correlation adjusted for degree of freedom.
 SEE = Standard error of estimate.
 DW = Durbin - Watson statistic.

All of the above equations have a coefficient of multiple correlation of more than 0.983; all coefficients have the expected sign and a 95% or more level of significance, except technology which has 93%.

Solving equations (17) to (19) simultaneously for variables GDP, EMP and PR, the following new equations are obtained.

$$(22) \text{ GDP} = -290.702 + 0.1482 \text{ T} - 1.1681 \text{ NEP} + 0.1389 \text{ RWOP} \\ -0.0929 \text{ RIR} + 0.00942 \text{ EMPL1}$$

$$(23) \text{ EMP} = -12891 + 6.5697 \text{ T} - 51.7819 \text{ NEP} + 6.1574 \text{ RWOP} \\ -4.1183 \text{ RIR} + 0.8627 \text{ EMPL1}$$

$$\begin{aligned}
 (24) \text{ PR} = & 165.32 + 0.1398 \text{ T} - 1.1021 \text{ NEP} + 0.1311 \text{ RWOP} \\
 & -0.0877 \text{ RIR} + 0.0089 \text{ EMPL1} - 1.1700 \text{ FWAP} + 0.1504 \text{ URL1} \\
 & + 0.0005 \text{ RPIL1}
 \end{aligned}$$

Equations (22) and (23) show that both the gross domestic product and total employment are positively determined by technology, real world oil prices and previous year's employment, but are negatively influenced by the National Energy Program and real prime rates. Equation (24) indicates that the labour force participation rate also depends indirectly on the above factors in addition to those mentioned in equation (7).

4. IMPACT OF OIL PRICES

As shown in equations (22) to (24), the world oil price is an important factor affecting the level of Alberta's economic activity, total employment and the labour force participation rate. A higher oil price always brings about a higher level of economic activity, higher employment and a higher participation rate in Alberta; and vice versa. Quantitatively, a one dollar increase in the world oil price (in 1971 dollars) is expected to result in an increase of about \$139 million of total output, about 6,157 more people employed and a rise of participation rate by 0.13 in Alberta. The average oil price elasticity is 0.081 for total output, 0.045 for total employment and 0.013 for the participation rate over the period 1971 - 1985.

By examining equations (11) to (13), together with equations (23) and (24), it can be shown that total labour force is positively affected and the unemployment rate is negatively influenced by the oil prices, but the magnitude of oil price impact varies with the size of total working age population due to the non-linear nature of equations (11) and (13).

In the following discussion, two different world oil price scenarios are examined and their impacts on Alberta's GDP and labour market are shown in Tables 1 and 2. The first scenario, called "base case", assumes the world oil prices will average \$15 (U.S.)/barrel in 1986 and will rise at the same rate as inflation to \$18.41(U.S.)/barrel in 1991. This oil price scenario is based on a presentation by C. Begie of Dominion Securities Pitfield Limited, to senior City of Edmonton officials on May 22, 1986. The second scenario uses the oil price forecasts prepared by the City of Edmonton Forecast Committee (June 1986). In this case, oil prices will average \$16 (U.S.)/barrel in 1986 and then increase gradually to \$27 (U.S.)/barrel in 1991.

In order to test the impact of the different oil price forecasts, both scenarios use the same set of assumptions on inflation rates, interest rates and government energy policy. As shown in Tables 1 and 2, under the base scenario, Alberta's GDP will decline by 1.23%, employment will fall by 6,800 persons and the unemployment rate will rise to 10.9% in 1986. The Alberta economy will recover slightly in 1987, with a 1.06% growth in GDP and 3,500 person gain in employment, but the unemployment rate will continue to increase to 11.9%. For the period 1988-1991, Alberta's GDP will rise by 1.58% to 3.05% per year, employment will rise to 1,208,000 persons, but the unemployment rate will peak at 12.8% in 1989 and fall slightly to 12.4% in 1991.

The economic activity in Alberta will be slightly healthier under the City Forecast Committee scenario as compared with the base scenario. The Alberta economy will similarly be in a recession in 1986, with 1.0% drop in GDP, 5,500 person loss in employment and the unemployment rate will also average 10.9%. Thereafter, the Alberta economy will recover gradually, with a growth rate of 1.7% to 3.4% over the period 1987 - 1991 and employment will reach 1,241,000 persons by 1991. The unemployment rate will peak at 12.6% in 1989 and then drop slightly to 12.2% in 1991.

In other words, the Alberta economy will produce \$31 million more output, employ 1,370 more persons and the unemployment rate will be 0.03% lower in 1986 under the City Forecast Committee scenario as compared with the base scenario. In 1991, the difference will be \$470 million in output, 32,830 persons in employment and 0.23% in the unemployment rate. Moreover, population, labour force, the participation rate and the real personal income per capita will be higher in the City Forecast Committee scenario compared with the base scenario. (See charts 1-8.)

5. CONCLUSIONS

The model presented in this paper describes the important factors influencing Alberta's economic activity and labour market. It catches reasonably well the impact of oil price changes. Based on this model, the sharp decline in the world oil prices is expected to slow down Alberta's economic growth to an average rate of 1.5% per year for the next five years under the base scenario and 2.1% per year under the City Forecast Committee scenario, compared with an estimated rate of 4% in 1985 and 6.3% per year during the boom period of 1971 to 1981. Alberta's unemployment rate is expected to remain above 10.9% for the next five years under both scenarios, compared with 10.1% in 1985 and an average rate of 4.9% for the period 1971 to 1981.

It is recommended that the above model be used in the future to assess the impact of different oil prices on the Alberta economy. The impact of oil prices on the Edmonton economy will be discussed in a separate paper.

CHART 1
REAL GROSS DOMESTIC PRODUCT

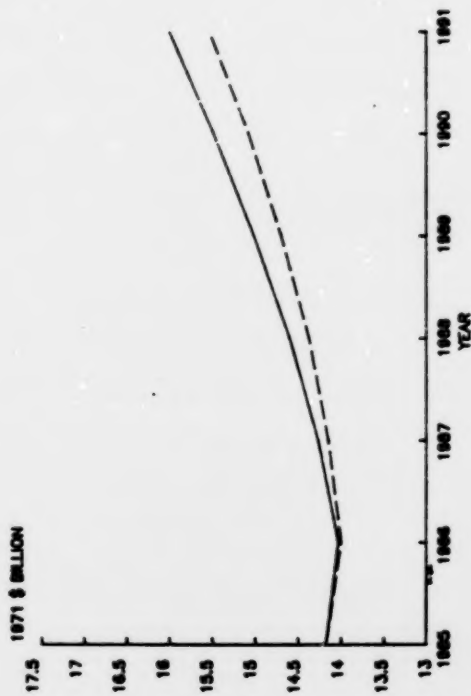


CHART 3
TOTAL POPULATION

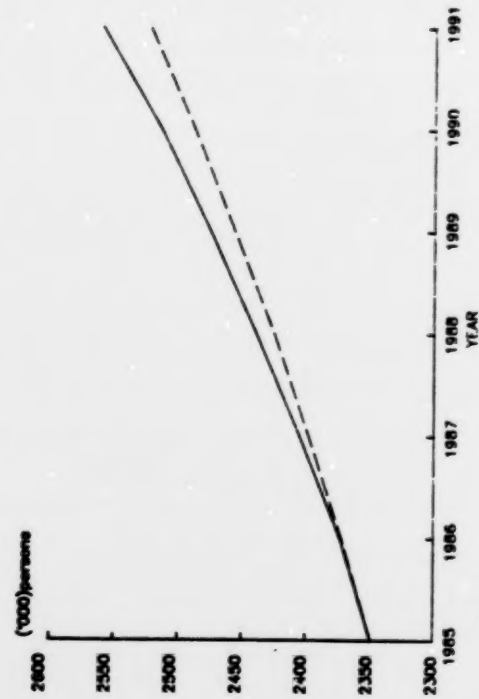


CHART 2
PERCENT GROWTH OF GROSS DOMESTIC PRODUCT

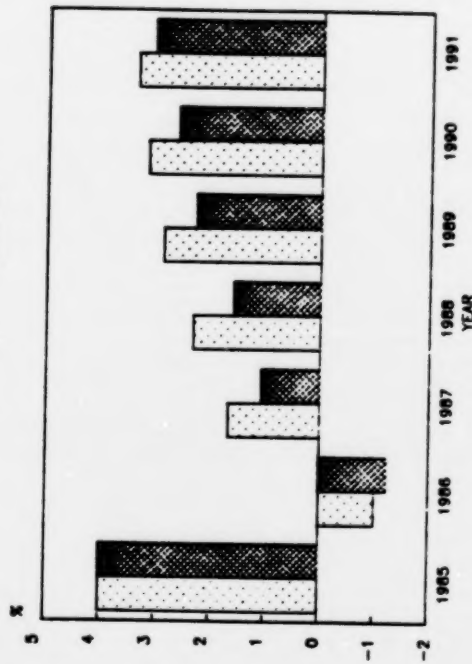


CHART 4
REAL PERSONAL INCOME PER CAPITA--

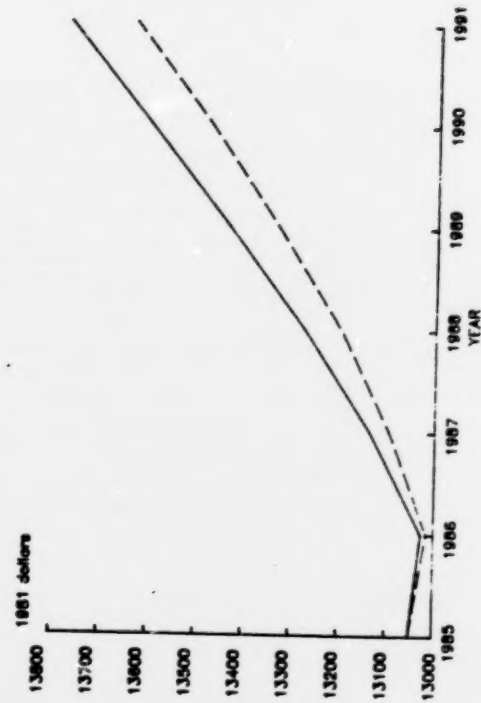


CHART 5
TOTAL EMPLOYMENT
CITY COMMITTEE
BASE CASE

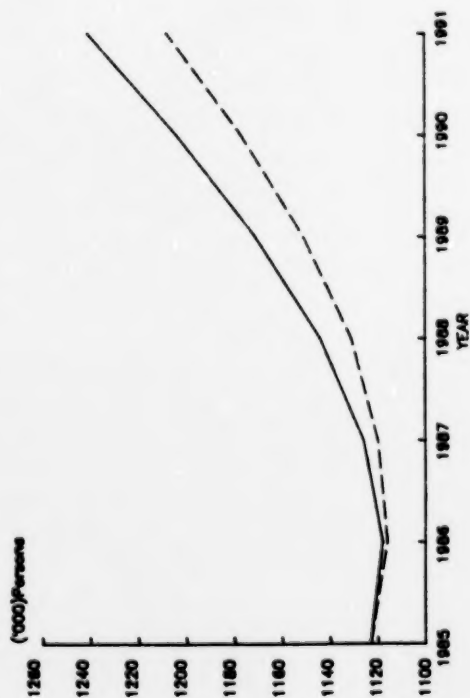


CHART 6
TOTAL LABOUR FORCE
CITY COMMITTEE
BASE CASE

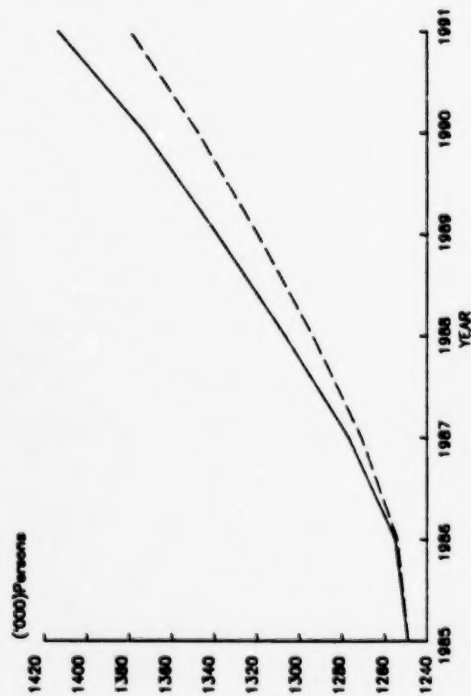


CHART 7
PARTICIPATION RATE
CITY COMMITTEE
BASE CASE

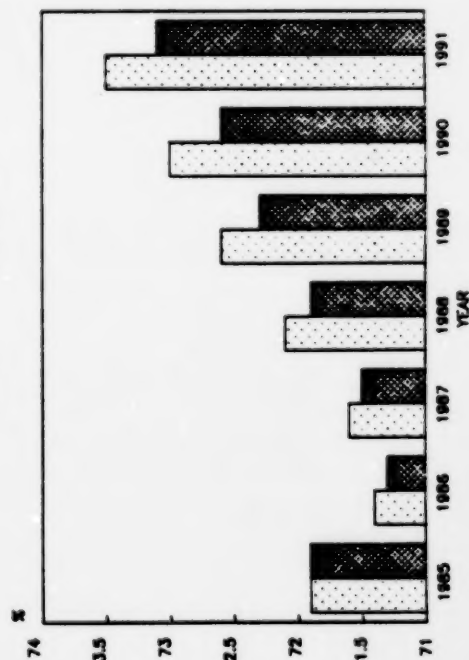


CHART 8
UNEMPLOYMENT RATE
CITY COMMITTEE
BASE CASE

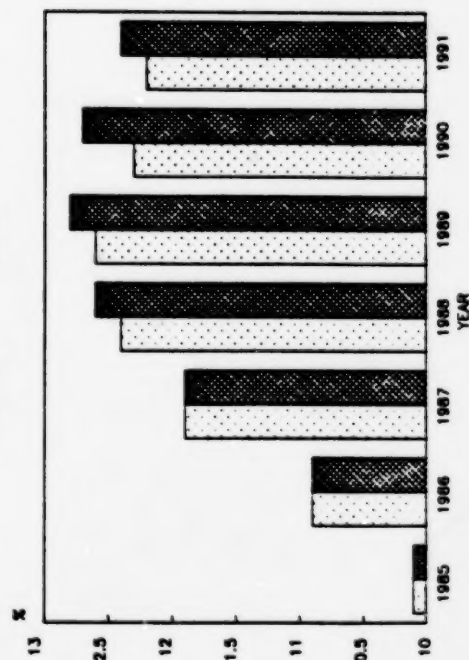


Table 1
OIL PRICE IMPACT ON ALBERTA'S GDP AND EMPLOYMENT
(City Forecast Committee)

YEAR	OIL PRICE	INFLATION	PRIME RATE	GDP DEFLATOR	REAL OIL PRICE	REAL PRIME	ALBERTA EMPLY.	GDP	Δ INC ^GDP
	(US\$/b)	(%)	(%)	(1971=100)	(US\$/b)	(%)	('000)	(\$billion)	(%)
1985	28.00	4.0	10.70	434.2	6.70	6.70	1,123	14.174	4.00
1986	16.00	3.3	10.50	448.5	3.57	7.20	1,118	14.030	-1.01
1987	19.00	3.5	10.00	464.2	4.09	6.50	1,126	14.265	1.67
1988	22.00	3.7	9.75	481.4	4.57	6.05	1,144	14.596	2.32
1989	24.00	4.2	9.50	501.6	4.78	5.30	1,171	15.015	2.87
1990	26.00	4.5	9.25	524.2	4.96	4.75	1,204	15.491	3.16
1991	27.00	5.0	9.00	550.4	4.91	4.00	1,241	16.011	3.36

(Base Case)

YEAR	OIL PRICE	INFLATION	PRIME RATE	GDP DEFLATOR	REAL OIL PRICE	REAL PRIME	ALBERTA EMPLY.	GDP	Δ INC ^GDP
1985	28.00	4.0	10.70	434.2	6.70	6.70	1,123	14.174	4.00
1986	15.00	3.3	10.50	448.5	3.34	7.20	1,116	13.999	-1.23
1987	15.53	3.5	10.00	464.2	3.35	6.50	1,120	14.148	1.06
1988	16.10	3.7	9.75	481.4	3.34	6.05	1,131	14.371	1.58
1989	16.78	4.2	9.50	501.6	3.35	5.30	1,151	14.697	2.27
1990	17.54	4.5	9.25	524.2	3.35	4.75	1,177	15.081	2.61
1991	18.41	5.0	9.00	550.4	3.34	4.00	1,208	15.541	3.05

Net Impact (Base - City Committee's)

YEAR	OIL PRICE	INFLATION	PRIME RATE	GDP DEFLATOR	REAL OIL PRICE	REAL PRIME	ALBERTA EMPLY.	GDP	Δ INC ^GDP
1985	0.00	0	0	0	0	0	0	0	0.00
1986	-1.00	0	0	0	-0.22	0	-1.37	-0.03	-0.22
1987	-3.47	0	0	0	-0.75	0	-5.79	-0.12	-0.61
1988	-5.90	0	0	0	-1.23	0	-12.54	-0.22	-0.74
1989	-7.22	0	0	0	-1.44	0	-19.68	-0.32	-0.60
1990	-8.46	0	0	0	-1.61	0	-26.91	-0.41	-0.55
1991	-8.59	0	0	0	-1.56	0	-32.83	-0.47	-0.31

Table 2
OIL PRICE IMPACT ON ALBERTA'S LABOUR MARKET
(City Forecast Committee)

YEAR	OIL PRICE	NET MIGRATION	POPULATION	FEMALE POP. RATIO	PERSONAL INCOME	WORKING AGE POP.	PART. RATE	LABOUR FORCE	UNEMPLOYMENT RATE
	(us\$/b)	('000)	('000)	(%)	(\$/person)	('000)	(%)	('000)	(%)
1985	28.00	-8.40	2,349	49.8	13,050	1,738	71.9	1,249	10.1
1986	16.00	-4.00	2,373	49.8	13,026	1,758	71.4	1,255	10.9
1987	19.00	3.00	2,405	49.9	13,136	1,784	71.6	1,277	11.9
1988	22.00	5.00	2,439	49.9	13,274	1,813	72.1	1,307	12.4
1989	24.00	7.00	2,475	49.9	13,434	1,844	72.6	1,339	12.6
1990	26.00	10.00	2,514	50.0	13,602	1,880	73.0	1,373	12.3
1991	27.00	15.00	2,560	50.0	13,773	1,922	73.5	1,414	12.2

(Base Case)

YEAR	OIL PRICE	NET MIGRATION	POPULATION	FEMALE POP. RATIO	PERSONAL INCOME	WORKING AGE POP.	PART. RATE	LABOUR FORCE	UNEMPLOYMENT RATE
1985	28.00	-8.40	2,349	49.8	13,050	1,738	71.9	1,249	10.1
1986	15.00	-5.00	2,372	49.8	13,015	1,757	71.3	1,254	10.9
1987	15.53	-3.00	2,398	49.9	13,095	1,778	71.5	1,271	11.9
1988	16.10	-1.00	2,425	49.9	13,198	1,801	71.9	1,294	12.6
1989	16.78	1.00	2,456	49.9	13,331	1,826	72.3	1,320	12.8
1990	17.54	3.00	2,488	50.0	13,475	1,855	72.6	1,348	12.7
1991	18.41	5.00	2,523	50.0	13,636	1,888	73.1	1,380	12.4

Net Impact (Base - City Committee's)

YEAR	OIL PRICE	NET MIGRATION	POPULATION	FEMALE POP. RATIO	PERSONAL INCOME	WORKING AGE POP.	PART. RATE	LABOUR FORCE	UNEMPLOYMENT RATE
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	-1.00	-1.00	-1.00	0.00	-10.88	-0.92	-0.03	-1.15	0.03
1987	-3.47	-6.00	-7.01	0.00	-40.76	-6.51	-0.11	-6.57	-0.00
1988	-5.90	-6.00	-13.10	0.00	-76.17	-12.01	-0.22	-12.70	0.11
1989	-7.22	-6.00	-19.25	0.00	-103.20	-17.97	-0.31	-18.72	0.25
1990	-8.46	-7.00	-26.48	0.00	-126.66	-25.01	-0.39	-25.42	0.34
1991	-8.59	-10.00	-36.80	0.00	-137.11	-34.74	-0.44	-33.83	0.23

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APPENDIX

HISTORICAL DATA, 1971 - 1985

APPENDIX

Historical Data, 1986 - 1991

Year	Gross Domestic Product (1971 \$billion)	% Change GDP	National Energy Program	World (2) Oil Price (US \$/barrel)
1972	7.866	6.6	0	2.29
1973	8.457	7.6	0	2.48
1974	9.296	9.9	0	5.04
1975	9.688	4.2	0	11.25
1976	10.139	4.7	0	11.25
1977	10.594	4.5	0	11.50
1978	11.186	5.6	0	12.70
1979	11.975	7.1	0	15.00
1980	13.227	10.4	0	28.75
1981	13.906	5.1	0	38.00
1982	14.553	4.7	0	34.00
1983	13.870	-4.7	1	34.00
1984	13.442	-3.1	1	29.00
1985	13.629	1.4	1	29.00
1986	14.174	4.0	0	28.00

Sources: (1) Statistics Canada

(2) Petroleum Marketing Commission - Calgary

APPENDIX

Historical Data, 1986 - 1991

Year	Real World Oil Price (1971 US\$/barrel)	Prime Rate (%) ⁽¹⁾	Real Prime Rate (%)	Population (000) ⁽²⁾
1971	2.29	6.48	3.58	1,628
1972	2.36	6.00	1.30	1,657
1973	4.21	7.65	-.05	1,690
1974	6.97	10.75	-.15	1,722
1975	6.11	9.42	-1.38	1,778
1976	5.65	10.04	2.54	1,838
1977	5.82	8.50	.60	1,913
1978	6.34	9.69	.89	1,983
1979	10.85	12.90	3.70	2,053
1980	12.57	14.25	4.05	2,141
1981	10.09	19.29	6.79	2,237
1982	8.42	15.81	5.01	2,319
1983	7.11	11.20	5.40	2,347
1984	6.88	12.10	7.70	2,341
1985	6.39	10.70	6.70	2,349

Sources: (1) Bank of Canada

(2) Alberta Bureau of Statistics

APPENDIX

Historical Data, 1986 - 1991				
Year	Working Age Population (000)	(1) % of Female Working Age Pop. (%)	Labour Force (000)	(1) Unemployment Rate (%)
1971	1,081	49.5	682	5.7
1972	1,111	49.5	708	5.6
1973	1,145	49.6	741	5.3
1974	1,190	49.6	781	3.5
1975	1,244	49.7	822	4.2
1976	1,302	49.7	871	4.0
1977	1,356	49.7	909	4.5
1978	1,409	49.8	960	4.7
1979	1,503	49.3	1,048	3.9
1980	1,579	49.2	1,120	3.7
1981	1,657	49.1	1,198	3.8
1982	1,718	49.1	1,227	7.7
1983	1,745	49.1	1,249	10.8
1984	1,740	49.3	1,254	11.2
1985	1,738	49.8	1,249	10.1

Sources: (1) Alberta Bureau of Statistics

APPENDIX

Historical Data, 1986 - 1991

Year	Participation (1)		Personal Income (1)		Real Personal Income Per Capita (1981 \$)
	Rate (%)		Per Capital (\$)		
1971	63.1		3,404		8,124
1972	63.7		3,788		8,648
1973	64.7		4,421		9,288
1974	65.6		5,243		10,063
1975	66.1		6,195		10,737
1976	66.9		6,887		11,054
1977	67.0		7,550		11,103
1978	68.2		8,385		11,316
1979	69.7		9,667		11,979
1980	70.9		11,045		12,424
1981	72.3		13,040		13,040
1982	71.4		14,254		12,865
1983	71.6		14,675		12,521
1984	72.1		15,303		12,710
1985	71.9		16,221		13,050

Sources: (1) Alberta Bureau of Statistics